

Santa Monica Bay Restoration Commission

**Progress Report on Implementation of the
Santa Monica Bay Comprehensive Monitoring Program**

October 2017

Background

Overview of the Santa Monica Bay CMP

The Santa Monica Bay Comprehensive Monitoring Program (CMP), which was completed in 2007, represents the Santa Monica Bay Restoration Commission (SMBRC)'s and the Santa Monica Bay National Estuary Program (SMBNEP¹)'s plan for implementing coordinated monitoring to provide a regional, long-term assessment of the status of the various ecosystems in Santa Monica Bay. The CMP was designed to shift the focus of monitoring from water quality of point source discharges to ecological conditions of the Bay habitats and fill the identified data gaps. The CMP was developed under the auspices of the SMBRC Technical Advisory Committee, through collaboration of major dischargers and regulatory agencies, including the Los Angeles Regional Water Quality Control Board (LARWQCB). Information collected for the CMP is essential to, and has been used for tracking, assessing, and reporting on the environmental results of management actions implemented to improve water quality and restoration habitats in the Bay and its watershed.

The CMP includes monitoring designs for five major habitat (or ecosystem) types within the Bay. These five habitats extend from the outer Bay to the high tide line along the shore and include the following:

- Pelagic Ecosystem
- Soft Bottom Ecosystem
- Hard Bottom Ecosystem
- Rocky and Sandy Intertidal
- Wetlands

Monitoring design for each habitat includes a core motivating question, related objectives, specific monitoring approaches, indicators, data products, as well as sampling designs detailing number and locations of stations, sampling frequency, and measurements to be collected. In addition, the CMP includes an implementation plan that suggests how each design element of the program could be funded through a combination of cooperative agreements, offsets to current compliance monitoring programs, and grant funding from a range of potential sources.

¹ Santa Monica Bay Restoration Commission (SMBRC) is the state entity partner of the SMBNEP. Other partners of the SMBNEP include the Bay Foundation (TBF) and the Santa Monica Bay Restoration Authority (SMBRA).

Overview of NPDES Monitoring Requirements

The LARWQCB supported the CMP implementation by adding requirements to the National Pollutant Discharge Elimination System (NPDES) permits of the two POTWs and the Chevron Refinery, enabling the dischargers to participate and contribute to the CMP implementation. The 2010 Hyperion Treatment Plant NPDES permit (permit) requires the discharger, each year at a spring LARWQCB meeting, to “...provide an informational report summarizing to date its contributing activities toward coordinated implementation of the Comprehensive Monitoring Program for Santa Monica Bay (SMBRC, January 2007).” In the 2011 Joint Water Pollution Control Plant NPDES permit, LARWQCB added a new requirement to provide an annual informational report summarizing the Sanitation Districts of Los Angeles County (LACSD)’s activities related to the coordinated implementation of the CMP. In addition, the 2013 Chevron El Segundo Refinery NPDES permit included a requirement to provide a similar informational report summarizing the company’s activities related to the coordinated implementation of the CMP. The SMBRC will use these informational reports to prepare and present a progress report on CMP implementation to the LARWQCB at one of its spring meetings.

In previous five years, both the City of Los Angeles Bureau of Sanitation (City of LA) and the LACSD submitted the informational reports summarizing their CMP implementation-related activities as required under the permit. Chevron El Segundo Refinery also submitted its informational report in the last three years. Using materials provided in these reports and other sources of information, the SMBRC prepared progress reports on CMP implementation for the LARWQCB and presented the reports in the last four years at the Board meetings in the spring each year.

The progress status reported below is an update to the 2016 progress report based on new information provided in the 2017 informational reports submitted by the three reporting entities (Appendices A, B, and C) as well as other information compiled by the SMBRC.

Progress and Status of Santa Monica Bay CMP Implementation

Progress continued in implementing the CMP during this reporting period (2016). Table 1 below summarizes the key program components of the CMP and the latest status of implementation. The table also specifically indicates the areas of contribution and support by the City of LA, the LACSD, and Chevron, and highlights new activities during this report period (in yellow shade). As the table shows and the attached informational reports elucidate, all three entities fulfilled their responsibilities under the permit and conducted monitoring activities in support of the CMP implementation.

Unless the similar reports submitted in previous years, there is no recommended future steps for achieving full implementation of the CMP. This is because beginning this summer, the SMBRC initiated a major update of the 10-year old CMP in collaboration with the Bay Foundation, which is its key partner of the National Estuary Program.

The table also points out several new projects and activities in 2016 that contributed to filling remaining monitoring gaps identified in the CMP and facilitated further progress in implementing the CMP in the years ahead. Although the CMP is undergoing a major update,

these activities are still included in this report and several are highlighted below, because they demonstrate the benefits and are likely to be incorporated in the updated CMP in response to new management priorities, such as the need to understand and address the impacts of nutrient loading and climate change.

Climate Change Impact Assessment – In 2016, County Sanitation Districts of Los Angeles County (LACSD), City of Los Angeles (City of LA), and the SMBNEP continue to collaborate with other federal, state, and local entities to carry out research and monitoring efforts needed for addressing the potential impacts of climate change, with focus on the causes and impacts of ocean acidification and hypoxia. These efforts include, but are not limited to the following:

- *Bight' 13 monitoring program* – All three entities are active participants of the Bight' 13 program, as discussed in detail in their progress reports (Appendices A-C). Under the Bight' 13 Nutrients Program, a set of sampling and data analysis for pH and alkalinity are being conducted, aimed at determining the spatial patterns and seasonality of pH and aragonite saturation state in the Southern California Bight (SCB). As part of this effort, both the LACSD and the City of LA completed the eighth and final quarterly sampling at multiple sites and depths for pH and alkalinity analyses during coordinated offshore sampling within the coastal areas of the Bight. A report describing the results has been submitted for publication. This effort will help to understand possible alterations to the southern California coastal ocean environment due to global climate change, as well as local anthropogenic factors that may contribute to observed changes.
- *Deployment of sensors for high-quality, high frequent pH and pCO₂ data collection in Santa Monica Bay* - With the EPA grant funding obtained by the SMBNEP and under a special study approved by the LARWQCB last year, a package of state-of-art sensors was deployed by LACSD since July 2016 in nearshore water off the Palos Verdes shelf to measure ocean acidification and hypoxia (OAH). LACSD has since maintained the mooring and the sensor package and downloaded data periodically from the deployed sensors. City of LA has provided laboratory support for calibration sample analysis, and Southern California Coastal Water Research Project (SCCWRP) has provided data storage service and carried out preliminary data analysis. These sensors' performance has been excellent, and will allow us to collect continuous, high quality data to identify variability patterns in oxygen, pH, and CO₂, which will enable identification of spatial and temporal trends and a variety of modeling and biogeochemical assessment studies aimed at understanding the contribution of local anthropogenic nutrients sources to OAH and harmful algal blooms (HABs).

While assessment of climate change impacts was not specifically listed as an objective in the 2017 CMP, it is anticipated that monitoring of these impacts on various components of the Bay ecosystem will be an important objective and incorporated into the monitoring designs under the updated CMP.

Nutrient Loading and Impact Assessment – Progress continued in 2016 in monitoring and assessment of nutrient loading through completion of the special study to examine historical chlorophyll-a data across the entire SCB using the temporally and spatially extensive data set from the California Cooperative Oceanic Fisheries Investigation (CalCOFI) which could to

provide context for the patterns, levels, and trends seen in primary productivity within Santa Monica Bay with the rest of the SCB and completion of a two-year receiving water sampling program began in 2014 to determine rates of nutrient uptake, conversion, respiration, and primary production (See Appendix A and B for details). The LACSD continue to explore the use of regional CalCOFI nutrient data to compare three CalCOFI sites within the Santa Monica Bay with comparable inshore sites from other parts of the SCB, and with the full data set that encompasses the entire SCB. These efforts will help to determine the frequency, spatial extent and seasonality of algal blooms (high chlorophyll features) in the SCB and how anthropogenic nutrient inputs affect ecological processes and rates that drive biological productivity, concentrations of dissolved oxygen, and aragonite saturation state.

In Fall 2015 The City of LA partnered with phytoplankton biologists from University of Southern California to carefully monitor Santa Monica Bay for algal blooms and HAB event during the six-week diversion of chlorinated, secondary-treated effluent to an auxiliary 1-Mile Outfall due to repairs to Hyperion Treatment Plant's 5-Mile Outfall required the for six weeks. The diversion event resulted in the input of a large volume and concentration of nutrients into the nearshore environment of SMB, which had the potential to cause algal blooms, including harmful species. 963 discrete samples were collected during the diversion and three distinct phytoplankton blooms were identified during this time period. Additional analyses and comprehensive assessment continued in 2016, with a final report submitted to the LARWQCB in April, 2017.

Pelagic Ecosystem Monitoring – In 2016 the LACSD, in collaboration with the City of LA, SCCWRP and National Oceanic and Atmospheric Administration Southwest Fisheries Science Center (SWFSC), participated in a Sea Grant project through an NPDES-permitted special study titled "Assessment of Ichthyoplankton Metabarcoding for Routine Monitoring". Field sampling was completed at multiple sites within Santa Monica Bay in 2016, and SWFSC scientists have completed taxonomic identifications. The molecular analysis of those samples using a new technique called "meta-barcoding" is currently underway.

If successful, this method will identify and quantify all fish species in each sample, based on genetic analyses of the blended larval fish tissue. It is anticipated that this study will build on and reinforce the historical ichthyoplankton and zooplankton programs of CalCOFI, and potentially lead to a valuable tool that POTWs, Marine Protected Area managers, SMBNEP, and others can utilize in the future. Depending on results, a similar study may be conducted throughout the entire SCB during Bight'18.

Wetland Monitoring – Despite the a lack of mechanism and commitment for systematic, long-term monitoring of wetland habitats in the Bay, the SMBNEP has and continues being directly involved in wetland monitoring and filling the gap in recent years. With funding support from the Coastal Conservancy and State Parks, the SMBNEP continued carrying out the pre- post restoration monitoring at Malibu Lagoon. 2016 marked completion of the fourth post-restoration monitoring year and a four-year comprehensive monitoring report has been developed and planned for release soon. With support of U.S. EPA Wetland Development Grant Program, SMBNEP has also been collaborating with SCCWRP and CalState Channel Islands for development of a regional Level-3 long-term monitoring program for wetland habitats.

Subtidal, Intertidal, and Beach Monitoring – In addition to wetlands, the SMBNEP has carried out and will continue to carry out a significant amount of monitoring activities for several important habitats in the Bay. These activities include on-going rocky subtidal and kelp monitoring as part of the multi-year rocky reef/kelp restoration project, sandy beaches and coastal dunes monitoring as part of the on-going Santa Monica Beach Restoration Project and El Segundo/LAX dune restoration project, and rocky-intertidal, monitoring as part of a summer intern program. These monitoring efforts contribute directly to implementation of the CMP, and to the habitat condition assessments in the next State of the Bay Report. Experiences learned from these efforts will also be integrated into the updated CMP, if applicable.

Eelgrass Monitoring. Sea grasses, e.g. eel grass and surf grass, are considered essential fish habitat that comprise a biogenic structure that provides nursery habitat for numerous species, improves water quality, retains sediment, and are viewed as increasingly important carbon sinks. The expanse and health of eel grass in Santa Monica Bay is poorly understood and remain an important data gap to address under the CMP. Progress was finally made in 2016 when National Oceanic and Atmospheric Administration (NOAA) and National Marine and Fishery Services (NMFS) contracted side scan sonar surveys to determine the presence and expanse of eel grass in the northern reach of Santa Monica Bay and up the coast towards the Los Angeles-Ventura County Line. The survey identified approximately 35 acres of eel grass in nearshore, with a large patch near Lechuza Point.

Future efforts by TBF will focus on SCUBA and remotely operated underwater vehicle (ROV) based surveys to confirm these results and collect additional data on the composition of the biotic community associated with eel grass beds. Additional efforts are also been made to plan for mapping the remainder of the nearshore environment of Santa Monica Bay with NOAA, NMFS, and other stakeholders.

The current CMP was developed in 2007. Since that time, monitoring needs have grown to address new and emerging issues such as climate change (OA, HAB, hypoxia), water resource management, TMDL compliance, and contaminants of emerging concern (CEC). There have also been persistent gaps in monitoring of many types of Bay habitats and new data gaps identified during the 2010 and 2015 State of the Bay reports. To address these new monitoring needs as well as support the planned Bay Restoration Plan update, SMBNEP plans to develop an updated CMP during FY18. The update will be conducted by working with the TAC and agencies responsible for existing monitoring programs in the Bay and will involve identification and prioritization of data gaps, revision to existing or adding new designs to incorporate new monitoring needs, revision of the structure and format of the CMP (if necessary), and development of implementation mechanisms.

SMBNEP plans to involve and work with LARWQCB staff and NPDES dischargers in the CMP update and in developing CMP implementation mechanisms, including incorporation of the newly updated relevant CMP components into the NPDES permits. With the support of the LARWQCB, the SMBRC is committed to continue working collaboratively with existing partners and facilitate participation of more stakeholders to fully implement the CMP.

Appendix A. Sanitation Districts of Los Angeles County Informational Report: Summary of Activities toward Implementation of the Santa Monica Bay Restoration Commission Comprehensive Monitoring Program, April 20, 2017.

Appendix B. City of Los Angeles Bureau of Sanitation Informational Report: Summary of Activities to Meet Hyperion Treatment Plant Permit Requirements Highlighting Santa Monica Bay Comprehensive Monitoring Program Participation in 2016, April 2017

Appendix C. Chevron Products Company El Segundo Refinery: Bay Comprehensive Monitoring Program (CMP) Participation Annual Summary, March 2017

Table 1: Status of Santa Monica Bay Comprehensive Monitoring Program (CMP) Implementation
(New activities in 2016 is highlighted in yellow)

Program Objective and Component	Implementation Status	LACSD Participation	City of LA Participation	Chevron Participation	Next Steps (If Needed)
Pelagic Ecosystem					
Existing CalCOFI grid (101 stations in So. Cal.) for chlorophyll, zooplankton, sea surface temperature, salinity, thermocline depth, dissolved oxygen, silicate, nutrients, primary productivity	On-going, LACSD and City of LA completed a review of CalCOFI data collected in SM Bay	Yes	n/a	n/a	Continue
Existing Central Bight Cooperative Water Quality Survey (CBCWQS, 84 stations) for chlorophyll, sea surface temperature, salinity, dissolved oxygen, transmissivity, pH, dissolved organic matter, thermocline depth. ADD: nutrients (nitrates, phosphates, ammonia, 15 stations)	On-going, except for monitoring of nitrate, nitrite, phosphate and silicate	Yes	Yes	Yes, 16 offshore stations in front of the Refinery	Add nutrients to the program. Add new mooring for continuously monitor pH, oxygen, chlorophyll, and other water parameters
Fish larvae transects for measuring changes in relative abundance and frequency of occurrence of key species	Special study is underway to assess the applicability of ichthyoplankton meta-barcoding for routine monitoring	Yes	Yes	TBD	Continue
Existing shoreline temperature network	On-going	n/a	n/a	n/a	Continue

Existing CDFW recreational catch estimates, by fishing blocks (10)	On-going	n/a	n/a	n/a	Continue
Existing NMFS Recfin sampling sites for numbers of recreational fishing trips and weight and # of fish caught	On-going	n/a	n/a	n/a	Continue
Bottlenose dolphin & seabird surveys for relative abundance, location, timing, behavior, tissue contaminant levels on 30 inshore and offshore individuals	Several annual surveys were conducted in 2000s. Discontinued after 2010 due to lack of funding. Seabird tissue contamination survey was conducted as part of Bight 13.	May provide field and lab support for marine mammal tissue contamination surveys in conjunction with the Bight program	TBD	TBD	Seeking support; secure funding or in-kind service for implementation
Existing CDPH Marine Biotoxin Monitoring Program for toxin levels in shellfish and incidence of toxic blooms	On-going, multiple locations in Santa Monica Bay	Voluntarily collects one phytoplankton sample per week for CDPH program	Voluntarily collects three phytoplankton samples for the CDPH Program	TBD	Continue
Existing Coastal power plant impingement & entrainment	On-going	n/a	n/a	n/a	Continue
Existing American Cetacean Society Gray Whale Census	On-going	n/a	n/a	n/a	Continue
Existing SCCOOS Oceanography buoys	On-going	n/a	n/a	n/a	Continue

Existing NMFS marine mammal stranding network	On-going	n/a	n/a	n/a	Continue
Existing USFWS seabird conservation program for monitoring abundance, population status, and threats.	On-going	n/a	n/a	n/a	Continue
Special harmful algal blooms studies	- Bight' 13 nutrient survey is completed by early 2016 and data analysis continues	Yes, Bight' 13 nutrient survey only	Yes, Bight' 13 nutrient survey only	Yes, Bight' 13 nutrient survey only	Continue
Soft Bottom Benthos					
Existing POTW and Bight Program for determining status of infauna, demersal fish, and macrofauna, tracking fish tissue contamination, sediment chemistry, and toxicity over time.	On-going	Yes, also repeated sediment coring survey at EPA's request and conducted water column DDT/PCB special study	Yes	Yes, limited to sediment chemistry only	Continue
Existing CDFW recreational and commercial catch estimates, by fishing blocks	On-going	n/a	n/a	n/a	Continue
North Bay ASBS survey (as portion of the Bight Program) for determining status of infauna, demersal fish, and macrofauna, tracking fish tissue	Partially carried out as part of the Bight '08	n/a	n/a	n/a	Next step TBD with SWRCB

contamination, sediment chemistry, and toxicity.					
Special study for investigating inshore halibut nursery grounds	To be implemented	TBD	TBD	TBD	Seek funding to initiate the study
Hard Bottom Benthos					
Random grid, 5 strata survey (120 stations) using CRANE protocol for invertebrates, fish, and algae	Continue to be partially carried out under SMBNEP's kelp restoration program	Yes	TBD	TBD	Seeking support; secure funding or in-kind service for long-term implementation
CRKSC over-flights for estimating kelp canopy coverage	Implemented since 2002	Yes	Yes	Yes	Continue
Existing CDFW recreational and commercial catch estimates, by fishing blocks	On-going	n/a	n/a	n/a	Continue
Existing coastal power plant impingement of rocky reef organisms.	On-going	n/a	n/a	n/a	Continue
Existing long-term rock-reef fish survey at Palos Verdes Point and King Harbor	On-going but intermittent due to lack of stable funding	Yes	n/a	n/a	Seek stable funding to ensure its continuation
Existing Ocean Resource Enhancement Hatchery Program gill net assessment	On-going	n/a	n/a	n/a	Continue
North Bay annual ASBS survey using CRANE protocol for invertebrates, fish, and algae	Partially implemented	Yes	n/a	n/a	Seeking support; secure funding or in-kind service

					for implementation
Reconnaissance and 1/10 year survey of deep banks, canyons, shelf edge for species list, abundance, and distribution	To be implemented	May expand existing ROV monitoring program to assist the survey	TBD	TBD	Seeking support; secure funding or in-kind service for implementation
Special study for assessing potential MPA sites	Completed as part of State MLPA process and through SMBNEP-sponsored studies	n/a	n/a	n/a	Transition to long-term MPA monitoring under the auspices of State MPA Monitoring Enterprise
Special study for initial assessment of kelp reefs	Completed through SMBNEP-sponsored studies	n/a	n/a	n/a	n/a
Special study for developing index of reef community condition	An index based on fish guild was developed as part of SMBNEP rocky reef study and Bight '08 survey. Further development of a community index is underway as part of the Bight 13 survey	Yes	TBD	TBD	Continue and complete development of the index
Rocky and Sandy Intertidal					

3 existing and 8 additional MARINE rocky intertidal survey stations for suite of indicators (13 indicator species and physical conditions)	On-going but intermittent due to lack of stable funding.	n/a	n/a	n/a	Seeking support; secure funding or in-kind service for implementation
Existing annual grunion survey for location, frequency, relative intensity of grunion runs (7 stations).	On-going but intermittently due to lack of stable funding	n/a	n/a	n/a	Seek stable funding to ensure its continuation
Annual surf-zone fish survey (3 stations)	To be implemented	n/a	n/a	n/a	Seeking support; secure funding or in-kind service for implementation
Bird roosting site (6 stations) and existing estuary (5 stations) survey for presence/absence, counts, timing of gulls, terns, and shorebirds	To be implemented	n/a	n/a	n/a	Seeking support; secure funding or in-kind service for implementation
Existing CDFW rare bird species survey for abundance of adults, young, total nesting attempt, etc. (4 beaches)	On-going	n/a	n/a	n/a	Continue
Annual regional sandy beach plant survey for species, relative abundance, and location	Monitoring were conducted by SMBNEP as part of the on-going Santa Monica Beach Restoration Project and El	n/a	n/a	n/a	Seeking support; secure funding or in-kind service for implementation

	Segundo/ LAX dune restoration project				
Special study for developing index of rocky intertidal community condition	Expert panel continued developing the index with logistical support from SCCWRP.	n/a	n/a	n/a	
Special study for potential grunion egg indicator	To be implemented	n/a	n/a	n/a	
Special study for archiving historical bird survey data	To be implemented	n/a	n/a	n/a	
Special study for developing index of regional bird community condition	To be implemented	n/a	n/a	n/a	
Special study for investigating tissue contamination in surf-zone fish and sand crabs	To be implemented	n/a	n/a	n/a	
Reconnaissance study of shallow nearshore infauna community	To be implemented	n/a	n/a	n/a	
Wetlands					
IWRAP Bight-wide grid (60 stations bight-wide) for a suite of indicators (Stressors, CRAM, hydrology, physical processes, contamination, biochemistry, eutrophication, fish, and infauna birds)	Partially implemented as part of Bight '08	n/a	n/a	n/a	Seek stable funding to ensure its continuation

Intensified random grid in the Bay (60 stations) for CRAM, inlet condition, tidal range, and plant community)	Continue to be partially implemented at targeted wetlands (Ballona and Malibu) as part of restoration project and EPA Wetlands Development Program	n/a	n/a	n/a	Seek stable funding to ensure its continuation
Project-specific evaluations of hydrology, soils, key plant and animal taxa, including infauna, water quality, sediment chemistry, and sediment toxicity		n/a	n/a	n/a	

TBD: To be determined.